PHOTOGRAPHIC MANUALS, No. II.

PRACTICAL HINTS

ON

THE DAGUERREOTYPE;

BEING

SIMPLE DIRECTIONS FOR OBTAINING PORTRAITS, VIEWS, COPIES OF ENGRAVINGS AND DRAWINGS, SKETCHES OF MACHINERY, ETC., ETC.

BY THE

DAGUERREOTYPE PROCESS;

INCLUDING THE LATEST IMPROVEMENTS IN FIXING, COLOURING, AND ENGRAVING THE PICTURES; WITH A DESCRIPTION OF THE APPARATUS.

Illustrated with Engravings.

J. H. Croucher.

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PRACTICAL HINTS

ON

THE DAGUERREOTYPE.

NOTWITHSTANDING the many valuable discoveries with which the researches of Sir John Herschell, Mr. Fox Talbot, Mr. Robert Hunt, and other distinguished philosophers, native and foreign, have recently enriched the science of Photography, or, as it is now termed, Actino-Chemistry,* the Daguerreotype process, first divulged in 1839, still retains the highest place in public estimation. The extreme beauty and delicacy of the pictures produced by this method, and the comparative simplicity and certainty of the operation, fully justify this preference, and account for the large number of amateurs who are pursuing it in the present day, with more or less success. While, however, the process is simple in itself, it requires much care and nicety of manipulation, which is only to be acquired by continued practice, or by the most careful attention to the directions which are given by proficients in the art,—and without which the operator is exposed to frequent annoyance and disappointment. It is with the view of providing this necessary assistance, that the following Hints have been thrown together, in which all technicalities have been as much as possible avoided, and the directions made short and plain, so as to be easily understood and followed.

The history of this invention is well known: Monsieur Daguerre had for some time devoted his attention to the subject of Photography, particularly to the means of fixing the images obtained in the camera obscura. While pursuing these enquiries in conjunction with his partner, Mr. Niepcée, he was led to adopt an entirely new

* This term was suggested by Sir John Herschell, and adopted at a Meeting of the British Association, in September, 1844, to indicate that department of Chemistry which is connected with the influence of the solar rays.

process, which, after many years of study and experiment, was produced under the name of the Daguerreotype. The French government appreciating the utility of invention, purchased it for the benefit of all nations, granting to M. Daguerre a pension of 6,000 francs per annum for his life, and a proportional sum to M. Isidore Niepcée, the son of his former partner. Since the introduction of the Daguerreotype, very many improvements have been introduced, chiefly with a view to increase the sensibility of the plates, on which the effect of light is now, with fine lenses, almost, if not quite, instantaneous.

As the possession of a good apparatus is an essential attribute of success in taking Daguerreotype pictures, it will be well to begin by describing the various articles which are necessary or convenient for this purpose. They are as follows:—

Camera Obscura.

The Camera Obscura, used for taking Daguerrotype Pictures (Fig. 1,) is a wooden box, furnished in front with a brass tube, in which an achromatic lens is made to slide. The image is received on a piece of ground glass fitted in a frame, which slides in a groove in the back of the camera, and the focus is adjusted by a rack-work in the brass tube of the lens. The frame and glass may be withdrawn, and another frame introduced,—

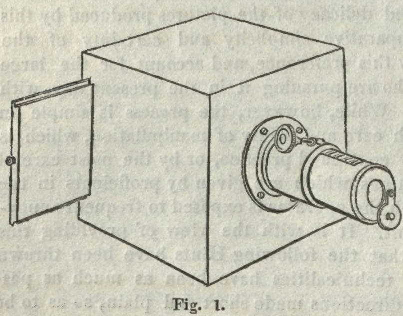

Fig. 1.

consisting of a wooden back, made to hold the silver plate, and a sliding front which can be raised when the plate is to be submitted to the action of the rays of light passing through the lens. This Camera may be made of any dimensions, according to the diameter of the lens employed.

Willats's Improved Photographic Camera, (Fig. 2,)

Is a great improvement on that just described. The lens,

instead of sliding in a brass tube, is bedded in the front of the Camera, by which an increase of light is obtained, the quantity admitted being regulated by a diaphragm having apertures of different diameter. The back part of the camera slides into the front and, to secure a very accurate adjustment is mounted with a screw. It is moved in or out by turning a small handle at the back. This camera is arranged with two grooves (*a* and *b*), so as to allow the use of two lenses of different focal powers, according as portraits or views are desired.

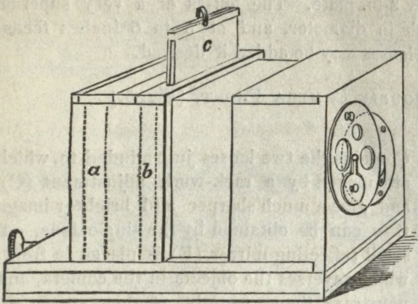

Fig. 2.

The frame with the ground glass (Fig. 3) is furnished with a moveable top and sides, which when extended, exclude the light, and aid the operator in determining the best focus.

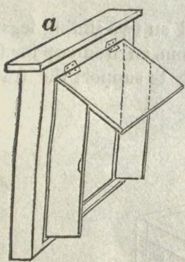

Fig. 3.

The second frame, (Fig. 4) consists of a box (*b*) made to receive thin wooden frames adapted to the various sized daguerreotype plates, which may be placed horizontally or vertically, at pleasure:—this frame is furnished with a sliding door (*c*), laying over the top of the camera when raised.

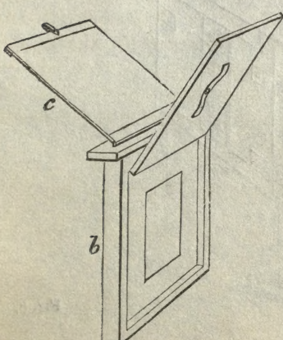

Fig. 4.

These cameras are usually made about 8 inches broad by $6\frac{1}{2}$ high, and will carry a 4 by 3-in. plate. The lenses of a very superior quality are of $1\frac{3}{4}$ inch in diameter, and of 5 to 6 inches focus. Double combination lenses may be added if desired.

The Double Camera Front, (Fig. 5,)

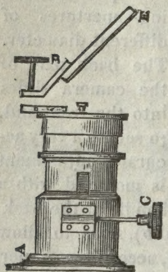

Fig. 5.

Contains the two lenses just alluded to, which are moved by a rack-work adjustment (C), and give a much sharper and brighter image than can be obtained by the single lens. A small reflecting mirror (E) is placed in front, which reverses the objects in the camera, and pourtrays them exactly as they appear in nature. This combination is far more rapid in its operation than the single lens.

Mercury Box.

This is a small box (Fig. 6) supported on two sliding legs, for the sake of portability, having in the bottom an iron cup for holding the mercury, and in the inside a ledge to support the frame.

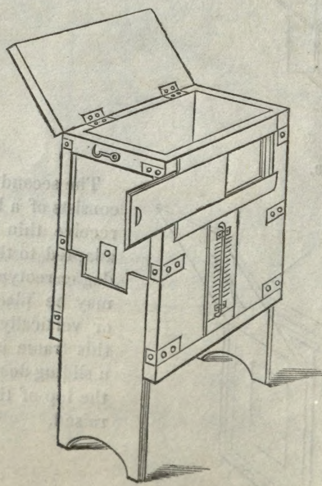

Fig. 6.

and plate. In the front is introduced a piece of glass, protected by a slide, to enable the operator to watch the developement of the picture. A small thermometer is usually added, the bulb of which dips into the iron trough, to enable the operator to observe the temperature of the mercury.

Iodine and Bromine Troughs, (Fig. 7.)

These are either of glass or Berlin ware, encased in wood; they are furnished with frames of various sizes to hold the plates, and with a cover of slate or glass. They may be used for any of the sensitive solutions.

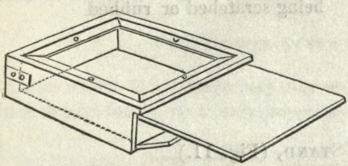

Fig. 7.

Polishing Block with Cover, (Fig. 8.)

This block is made of a shape and size convenient to the hand:—the plate adheres firmly to the prepared surface of the block, but may be readily disengaged when the process of polishing is completed.

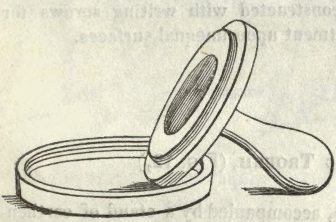

Fig. 8.

The Buff, (Fig. 9,)

Consists of a piece of wood of suitable dimensions, generally about twelve inches by three, covered with several folds of white cotton velvet, thoroughly cleansed from dirt, or grease.

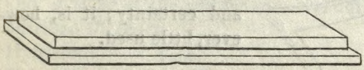

Fig. 9.

PLATE BOX, (FIG. 10.)

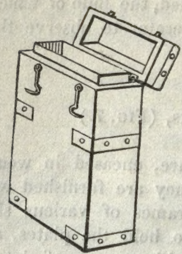

Fig. 10.

These boxes are of wood, or japanned metal, fitted with grooves which prevent the plates from touching each other:—they are very necessary to prevent the plates from being scratched or rubbed.

FIXING STAND, (Fig. 11.)

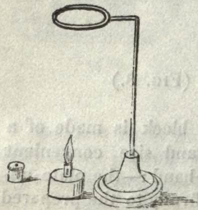

Fig. 11.

This is a wire stand, made to support the plate in an horizontal position, while heat is applied in the fixing process: it is also constructed with writing screws for adjustment upon unequal surfaces.

THE WASHING TROUGH, (FIG. 12,)

Is of metal, or Berlin ware, accompanied by a stand of earthenware, by which the frame is supported in the proper position while washing. An apparatus has been constructed for performing this operation with greater ease and certainty; it is, however, little used.

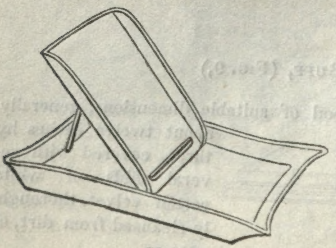

Fig. 12.

Claudet's Frame and Improved Ditto.

Both these frames are used for carrying prepared plates. The first is a thin metal frame, of the same dimensions as the plates it is intended to carry, and is placed between them to keep them from the light, and to prevent their touching each other, or gathering dust. In this state they may be tied together, and carried in the pocket without danger. The second is the same frame in a metal case, which closes tightly, and still more effectually secures them from light, dust, or contact.

The Tripod Staff, (Fig. 12,)

Upon which the camera may be rested, when no other suitable place can be found, is a very necessary auxiliary in taking views; it is about 4 feet 6 inches high, and carries a small table on which the camera is placed.

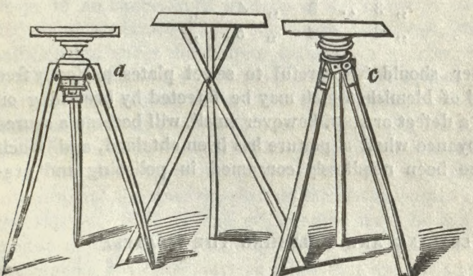

Fig. 12.

There are several varieties, differing in their construction and price.

The operator will also require a spirit lamp, with a large wick, for heating the mercury, etc., etc.

Cotton Wool, which must be thoroughly clean, and free from grease.

Prepared Tripoli, or Rotten Stone.

Prepared Lamp Black.

Olive Oil and Alcohol.

Chloride of Iodine.

One or other of the various sensitive solutions.

Distilled Mercury.

Hyposulphite of Soda.

Chloride of Gold, or Hyposulphite of Gold.

Frames of various sizes and patterns are made for mounting the Daguerreotype Pictures with or without cases.

DESCRIPTION OF THE PROCESS.

We shall now proceed to describe, briefly and clearly, the Daguerreotype process, as practised by the most successful operators of the day, omitting such variations as are not essential to the production of good proofs, and which tend rather to confuse than instruct the amateur, but not knowingly discarding anything which can facilitate his progress. And first, a remark or two on the silver plates, upon which the picture is obtained.

These plates are made expressly for the Daguerreotype. There are several sizes, the more useful of which are as follows:—

No. 1	..	2	by	$2\frac{1}{2}$	inches.
„ 2	..	$2\frac{3}{4}$	„	$3\frac{1}{4}$	„
„ 3	..	3	„	4	„
„ 4	..	4	„	5	„

The purchaser should be careful to select plates perfectly free from any kind of blemish, which may be detected by breathing on the plate, as a defect or spot, however small, will become a source of great annoyance when a picture has been obtained, and much time will have been needlessly consumed in polishing and preparing them.

Cleaning and Polishing the Plates.

This operation must be performed with great care. Having fixed the plate on the plate-holder, shake over it some finely powdered tripoli, or rotten-stone, add a small quantity of pure alcohol, and with a piece of prepared cotton proceed to rub the plate with a rapid circular motion, taking care not to press upon it with much force:—the paste formed by the alcohol and tripoli, must then be well cleaned off with fresh wool and dry tripoli, and the above process repeated two or three times, until a clean surface of pure silver is obtained. This is the best plan for a new plate:—if the plate has been used before, and the picture has not been what is termed fixed, the above operation will suffice; but if it has been fixed, it is sometimes necessary to use a little olive oil with the tripoli in the first instance, and then proceed with the tripoli and alcohol as before. The plate is now ready for polishing, which is best performed by rubbing the plate rapidly over the buff, which must be kept well supplied with prepared lamp-black,

pressing the plate hard and evenly against it, and changing the direction frequently, but always ending by polishing in a direction which will cross the picture you wish to obtain upon it; that is, if the plate is to be placed upright in the camera, finish it from side to side, and vice versa. The last polish should be given a short time before the plate is to be used; and any dust which may remain on it should be removed carefully, holding the plate in an inverted position, wth a piece of cotton or a camel's hair pencil, just before the process of iodizing.

Iodizing the Plates.

The best way of securing an even coat of iodine on the plate, is to use the chloride of iodine, diluted with water, two or three drops to an ounce, until it assumes the colour of pale sherry. A little of this mixture being poured into the trough, (described p. 7) sufficient to cover the bottom to about a quarter of an inch in depth; the plate must then be placed in the frame, and carefully put over this solution to expose it to its vapour: in about a minute and a half, or two minutes, according to the temperature of the atmosphere, the plate will be found, on inspection, to have acquired a yellow tint, which will vary from a pale to a rich golden tint, according to the time the plate is allowed to remain in contact with the vapour. This degree of intensity must be varied, to suit the quality of the accelerating liquid employed, as will presently be explained; but care must be taken that the tint on the plate does not pass to the violet, or its sensitiveness will be diminished. The colour of the plate may be inspected, by raising it and turning it towards a white light, replacing it quickly on the trough. When sufficiently iodized, it may be laid aside in the frame with its face downwards, without injury. The same mixture may be used again several times; but it is better to renew it after each time of preparation. Iodine strewed at the bottom of the trough, and covered with fine sand, may replace the chloride mixture, and will last much longer, if carefully covered after use with an air-tight glass or slate cover.

Accelerating Liquids.

There are many varieties of these known by the names of Eau Bromée, Bromide of Iodine, Redman's Sensitive Solution, Hungarian Liquid, etc., etc. The two latter are much used in England,

and will be found to answer well if properly applied. The liquid is diluted with water in the proportion of about one dram to an ounce and a half. A sufficient quantity having been poured into the trough, the plate is placed over it, and allowed to remain until it acquires a red colour, approaching in some cases to violet. The following rules will guide the experimenter in using the different liquids. If bromide of iodine be used as the accelerating agent, the plate should remain over the iodine solution, until it is of a deep yellow tint: and over the bromide, till of a deep rose colour. If Redman's solution, or the Hungarian liquid, a pale yellow and light rose will be found to answer best. As a general rule:—if the yellow colour produced by the iodine be pale, the red should be pale also; if deep, the red must incline to violet. When several plates are to be prepared at the one time, the same solution will serve for all; but it seldom answers to preserve the mixtures for any time; and its use, after keeping, is one great cause of the failures which so annoy amateurs. The bromine contained in these solutions is very subtle, and escapes, leaving little else but iodine remaining, which will, after some little time, give a red colour to the plate, without rendering it sensitive, entirely disappointing the expectations of the operator. The colour of the plate may be examined as before, but care must be taken to replace the plate over the solution for a few seconds, which removes the effect of the light. When the liquid is renewed at each operation, one inspection, at an interval determined by experience, will be generally sufficient. From thirty to sixty seconds, according to temperature, are usually required to produce the effect; in certain states of the atmosphere, a much longer time may be necessary. The plate is now ready for the camera, and may be kept for twelve or eighteen hours, if due care is taken to keep it secure from light or dust. Plates prepared over night are often considered more sensitive than those prepared immediately before using. Frames to carry prepared plates, may be purchased at the opticians. The prepared plate must be transferred to the camera frame with extreme care neither to expose it to light, or rub the surface.

Exposure in the Camera.

The form of camera most suitable for the purpose, has been already described, page 5. The inside should be carefully dusted before using. Having been placed opposite to the object to be copied, and made perfectly steady, a clear and distinct representa-

tion of the object must be obtained upon the ground glass, which must then be withdrawn, and the frame containing the prepared plate introduced in its place. The shutter may then be drawn up, and the plate exposed to the light which passes through the lens. The time of exposure must be decided by observation and experiment; as so much depends on the size and construction of the lens or lenses, and the brightness or dulness of the season. With a good achromatic lens, from five seconds to a minute and a half, will be sufficient in almost every case. In another part will be found some Directions for taking Portraits, Views, etc. which will assist the beginner. The instant the assigned time has elapsed, the shutter must be closed, and the frame may then be withdrawn in readiness for the next operation.

Exposing the Plate to the Vapour of Mercury.

Into the cup at the bottom of the Mercury-box, put four or five ounces of mercury, which must be pure, dry, and free from moisture. It may be occasionally filtered by enclosing it in Chamois leather, and gradually and carefully twisting the leather till the mercury is forced through its pores clean and bright. The vapour of the mercury is raised by the application of a spirit-lamp to the cup which holds the mercury. When a thermometer is attached to the mercury-box, a temperature of about 90 degrees will raise the vapour of the mercury: if the box have no thermometer, the cup may be heated until the mercury is pleasantly warm to the finger. If the mercury cup is removed from the box in order to its being heated, it is well after that operation to wipe the outside, on which a slight steam from the spirit may have settled. The plate, without having been removed from the slide, is then placed over the mercury, where it must remain till the picture is perfectly developed. Its progress may be obseved by the light of a candle through the yellow glass in the front of the box. It generally takes eight to fifteen minutes, or even longer, to perfect the operation; if, however, no outline is visible in about three minutes, either the mercury has not been sufficiently heated, or the picture has been removed too soon from the influence of light in the camera. If the former be the case, the mercury may be again gently heated; but if made too hot, the plate will become covered with small white spots. The details are usually much better developed when the picture has been brought out slowly, and with a moderate degree of heat.

Setting the Picture.

When the picture is sufficiently developed, it may either be set at once, or carefully laid aside until a convenient opportunity occurs. To set Daguerreotype pictures, they must be washed in a suitable vessel, (a preserve pot large enough to contain the plate will answer the purpose,) first in very pure water, and then in a solution of hyposulphite of soda, about fifty grains to the ounce of water, which must be carefully strained, and to which may be added a small quantity of alcohol. The sensitive coating will soon be removed, and the plate should again be washed in pure water, agitating it perpendicularly, until the water runs off in a continuous stream.

Fixing the Image.

The plate being taken from the water, which should never be allowed to dry off, is placed upon a wire stand, adapted to preserve it in a perfectly horizontal position. The gold solution, which may be purchased of the opticians and chemists, or prepared according to the formula given in the Appendix, is poured on the plate, until it is entirely covered, and the flame of a large spirit lamp applied to the under surface, in such a way that every part may be equally heated. In a few moments, the picture will become very clear and bright, when the lamp must be withdrawn, and the plate removed quickly, and again plunged into cold water. The plate is now finally washed, by pouring pure water at a boiling heat over it, holding it as perpendicularly as possible. When the plate is quite clean, it may be dried by blowing gently downwards, and when neatly managed, it will be quite free from spots. The plate may be supported on a stand, as in the washing apparatus, Fig. 12, page 8, or held at the corner with a pair of pliars. The gold solution must be rejected if it should have changed colour, or deposited any precipitate.

The following new mode of fixing and strengthening pictures by oxidation, has been proposed by Mr. Charles G. Page, M. D., Professor of Chemistry, Columbia College, Washington :—

The impression being obtained upon a highly polished plate, and made to receive, by galvanic agency, a very slight deposit of copper from the cupreous cyanide of potassa, (the deposit of copper being just enough to change the colour of the plate in the slightest degree,) is washed very carefully with distilled water, and then heated over a spirit lamp, until the light parts assume a pearly transparent

appearance. The whitening and cleaning up of the picture by this process, is far more beautiful than by the ordinary method of fixation by a deposit of gold. A small portrait fixed in this way, more than a year since, remains unchanged, and continues to be the admiration of persons interested in this art. One remarkable effect produced by this mode of fixing, is the great hardening of the surface, so that the impression is effaced with great difficulty. I have kept a small portrait, thus treated, unsealed and uncovered for over a year, and have frequently exposed it in various ways, and rubbed it smartly with a tuft of cotton, without apparently injuring it; in fact, the oxidised surface is as little liable to change as the surface of gold, and is much harder.

To succeed well in this process, the impression should be carried as far as possible without solarization, the solution of the hyposulphite of soda should be pure, and free from the traces of sulphur, the plate should be carefully washed with distilled water, both before and after it receives the deposit of copper,—in fact, the whole experiment should be neatly performed, to prevent what the French significantly call *taches* upon the plate, when the copper comes to be oxidized.

The formula for the Daguerreotype process, which has now been given, will, we trust, enable the amateur to pursue his experiments with confidence and success. He will probably experience some disappointments, however carefully he may attend to the rules which have been laid down, for there are few among even the ablest experimenters who do not occasionally fail; yet his perseverance will often be rewarded by an excellent picture, when perhaps, he least expects it.

To obviate as much as possible these annoying failures, he should bear in mind the following Cautions, by which he may ofttimes discover the causes which prevent his success :—

Cautions.

1st. Never use the same accelerating liquid more than once or twice, and only at short intervals. It is better to throw it away after preparing such plates as can be prepared at the same time.

2nd. Be sure to replace the plate on the accelerating liquid for a moment or two after having observed the colour, and before putting it in the camera.

3rd. Wipe the lens, and remove all dust and dampness from the camera before using.

4th. Keep the camera and mercury box perfectly free from the vapour of iodine, bromine, etc.

5th. Filter the mercury through a piece of chamois leather, if it should have film or dust collected upon it; the hyposulphite solution used to remove the colour of the plate in setting, must also be filtered before using.

6th. Never use the gold solution after it has changed colour, or thrown down a precipitate. This solution requires filtering occasionally.

7th. Do not make the mercury too hot, it will spot the plate, and spoil the picture.

8th. The direct rays of light must not enter the camera in conjunction with those reflected from the object, the picture will be veiled, and the colour of the plate changed to a thick green.

9th. If the picture appear clouded, it is probably either because the plate has not been thoroughly cleaned, or has absorbed too much Bromine; in the former case, the plate must be cleaned more carefully, in the latter, the accelerating liquid must be changed, or its strength reduced. If it be covered with a white film, the plate has been exposed to light before putting into the camera, or too much light has entered the camera, which may be remedied by using a smaller diapragm. If the whites have become blue, it is overdone, or the mercury has been too much heated; if browned, it is solarized.

COLORED DAGUERREOTYPES.

Daguerreotype portraits are now frequently met with beautifully colored; but the coloring is a process requiring great care and judgment, and many good pictures are spoilt in fruitless experiments. Several different methods of coloring have been proposed. The simplest mode appears to be that of using dry colours ground to a fine powder, and mixed with a little gum, also finely powdered. These are laid on with a fine camel's hair pencil, taking up very little colour at a time, and will adhere to the plate by breathing over it; the picture must be well set. The best colours for this purpose are carmine, rouge, chrome yellow, and ultramarine, by combining which any tint may be obtained.

Mr. Claudet's method is to dip a finely-pointed pencil in spirits of wine, and taking a little of the colour, which must have been pounded with spirits of wine, and again pulverized in a glass mortar, —to apply it upon the plate. This coating must be slight, and may be repeated if necessary; but if too much is put on, it is difficult to remove: the dry colour is applied on this coating, to wbich it will be found to adhere.

Mr. Chevallier's plan is to trace on the glass which is intended to protect it, the outline of the picture, and then to tint it with the colours used for painting the dissolving views, so as to correspond with the picture underneath. When dry, the tracing may be effaced, the glass fixed, and the picture will then appear through, something in the style of a coloured lithograph.

M. Leotard de Seuze covers the plate with a transparent membrane, or vegetable paper, which he attaches by a solution of gum or size, heated in a water bath; on this membrane he applies colours, mixed with spirits of wine and gum, or with white varnish and alum.*

Mr. Page, whose new method of fixing the Daguerreotype proofs is given page 15, has thrown out the following suggestions on the subject of Coloring:—

As copper assumes various colours, according to the depth of oxidation upon its surface, it follows, that if a thicker coating than the first mentioned can be put upon the plate, without impairing the impression, various colours may be obtained during the fixation. It is impossible for me to give any definite rules concerning this last process; but I will state, in a general way, that my best results were obtained by giving the plate such a coating of copper as to change the tone of the picture, that is, give it a coppery colour, and then heating it over a spirit lamp until it assumes the colour desired. I have now an exposed picture treated in this way at the same time with the two above mentioned, and it remains unchanged. It is of a beautiful green colour, and the impression has not suffered in the least by the oxidation. Should this process be perfected, so as to render it generally available, it will be greatly superior to the present inartistical mode of stippling dry colours upon the impression; for the colour here is due to the surface of the picture itself. For pure landscapes, it has a pleasing effect, and by adopting some of the recent inventions for stopping out the deposit of copper, the green colour may be had wherever desired. In some pictures, a curious variety of colours is obtained, owing to the varying thickness of the deposit of copper, which is governed by the thickness of the deposit of mercury forming the picture. In one instance, a clear and beautiful ruby colour was produced, limited, in a well-defined manner, to the drapery, while all other parts were green.

* These three receipts are condensed from M. Lerebour's excellent Traité de Photographie, from which other valuable suggestions are taken.

PORTRAITS, VIEWS, ETC.

The following hints, gathered from various sources, will be useful to those who have not seen the operation performed by experienced practitioners:—

PORTRAITS.—The sitter should be placed in an easy natural position, in a chair which has a support or rest for the head; an iron rod, with a ring at the end, affixed to the back of the chair, which can be raised or lowered at pleasure, answers well. Portraits are taken with great rapidity in the open air: from five to twenty seconds being usually sufficient, with a good lens, and a clear sky. The direct rays of the sun must be carefully avoided, and it is often desirable to place the sitter under a kind of canopy, or roof of stuff, or glass, which should be blue, that color intercepting fewer of the chemical rays than any other. One side of the model should be rather more illuminated than the other; indeed the position, attitude, arrangement of the dress, etc., all require attention, with a view to artistical effect. If the portrait is taken in a room, the sitter should be placed in front of a door or window, through which there is a strong and uninterrupted light; the time of sitting must of course be extended: a minute to a minute-and-a-half will generally be required. The perfect illumination of the model may be assisted by mirrors, or white linen cloths arranged so as to reflect the light when it is most needed. A short focus lens is best for portraits, as it operates more quickly, but care must be taken to keep the whole of that part of the person appearing in the plate as much in the same plane as possible, otherwise any projecting part, as a hand or leg, will be represented greatly out of proportion. The position of the camera must be determined by circumstances; generally, it should be placed nearly on a level with the face, as the most important point of view. With respect to back grounds, some persons use painted scenes, representing terraces, balconies, gardens, etc.; but they are seldom so correctly managed as to appear well in focus, and certainly rather take off the attention from the main figure. A back ground of an even colour is preferred by many, and may be dark or light according to taste, and the dress or complexion of the model. In the former case, a drab or slate colour suits well; in the latter, an old blanket answers better than any thing else. A table with books, vases of flowers, etc. may be arranged by the side of the sitter, if care be taken that they come

nicely in the focus. Too much white in the dress should carefully be avoided.

Views.—The points from which buildings or views can be taken with the best advantage, vary so greatly, that the operator must be left pretty much to his own discretion, in choosing a position. As a general rule in taking a building, monuments, etc., it is advisable to place the camera at a distance of about twice its greatest dimensions, and, if practicable, at about one-third its height. If the whole of the building or buildings be not in the same plane, select the most important portion to be most clearly defined, or take several views, in each of which certain points are brought out more distinctly. If an old and new building are to be introduced in the same picture, which should, if possible, be avoided, a black screen or handkerchief, or some other opaque body, should be placed over the lens for a moment or two, so as to cut off the rays of light reflected from the brighter portions of the object, the position of which may be previously observed on the ground glass. The same precaution should be taken when the sky is very blue, or strongly illuminated by the sun. The best time for taking views, is undoubtedly the earlier part of the day, though good pictures are often taken in the afternoon. The time required to obtain a good impression, varies so much according to the lens, the weather, the hour, etc., that no certain rules can be given on the subject,—experience will prove the best guide.

Engravings, Drawings, etc. may be copied very beautifully with a little care; the whole of the model being in the same plane, there is little difficulty in producing a good effect. The object to be copied must be placed in a good light, taking care to have every part equally illuminated. To secure sharpness, the model is placed in the open daylight, in which case a proof may generally be procured in about fifteen seconds; in the full sunshine, the impression is made almost instantaneously.

Machinery, Statuary, and Articles of Vertu, require to be arranged in suitable positions, so that the light may fall upon the object most effectively. The light may be reflected from mirrors, white linen, etc. etc.

ENGRAVING DAGUERREOTYPE PLATES.

Several plans have been suggested for accomplishing this much desired object; none, however, seem so well adapted as the following, recently patented by M. Claudet, to whom the art is already much indebted. In the specification, the process is explained as follows :—

The process is established upon the following facts, which have come to the knowledge of the inventor :—

1. A mixed acid, composed of water, nitric acid, nitrate of potassa, and common salt, in certain proportions, being poured upon a Daguerrotype picture attacks the pure silver, forming a chloride of that metal, and does not affect the white parts, which are produced by the mercury; but this action does not continue long. Then, by a treatment with ammonia (ammonia containing already chloride of silver in solution is preferable for this operation), the chloride of silver is dissolved, and washed off, and the metal being again in its naked state, or cleansed from the chloride, it can be attacked afresh by the same acid. This acid acts better warm than cold.

2. As all metallic surfaces are soon covered, when exposed to the atmosphere, with greasy or resinous matters, it is necessary, in order that the action of the acid upon the pure silver should have its full effect, for the surface to be perfectly purified; this is effected by the employment of alcohol and caustic potash.

3. When a Daguerrotype picture is submitted to the effect of a boiling concentrated solution of caustic potash, before being attacked by the acid, the state of its surface is so modified that the acid spares or leaves, in the parts which it attacks, a great number of points, which form the grain of the engraving.

4. When the effect of the acid is not sufficient, or in other words, if it has not bitten deep enough, the effect is increased by the following process:—Ink the plate as copper-plate printers do, but with a siccative ink; when the ink is sufficiently dry, polish the white parts of the plate, and gild it by the electrotype process; then wash it with warm caustic potash, and bite in with an acid, which will not attack the gold, but only the metal in those parts which, having been protected by the ink, have not received the coating of gold. By these means the engraving is completed, as by the action of the acid alone it is not generally bitten in deep enough.

5. To protect the plate from the effects of wear, produced by the operation of printing, the following process is employed:—The surface of the plate is covered with a very thin coating of copper, by means of the electrotype process, before submitting it to the operation of printing; and when that pellicle or coating of copper begins to show signs of wear, it must be removed altogether, by plunging the plate in ammonia, or in a weak acid which, by electro chemical action, will dissolve the copper, without affecting the metal under it; the plate is then coppered again, by the same means, and is then ready for producing a further number of impressions. This re-coating operation may be repeated as many times as may be required. The following is the description of the whole process, which is divided into two parts, consisting of a preparatory and finishing process:—

Preparatory Engraving.—For this operation, which is the most delicate, it is necessary to have, 1. A saturated solution of caustic potash. 2. Pure nitric acid at 36° of the areometer of Beaumé (spec. grav. 1·333.) 3. A solution of nitrite of potassa, composed of 100 parts of water and 5 parts of nitrite, by weight. 4. A solution of common salt, composed of water 100 parts, and salt 10 parts, by weight. 5. A weak solution of ammoniacal chloride of silver, with an excess of ammonia. The ammoniacal chloride of silver must be diluted with 15 or 20 parts of pure water. In the description of the process, this solution will be called ammoniacal chloride of silver. 6. A weak solution of ammonia, containing 4 or 5 thousandths of liquid ammonia. This solution will be called ammoniacal water. 7. A weak solution of caustic potash, containing 4 or 5 thousandths of the saturated solution, which will be called alkaline water. 8. A solution composed of water 4 parts, saturated solution of potash 2 parts, alcohol 1 part, all in volume. This solution will be called alcoholized potash. 9. Acidulated water, composed of water 100 parts, and nitric acid 2 parts, in volume. Besides, it is necessary to have three capsulæ or dishes, made of porcelain, large enough to contain the plate, and covered with an air-tight piece of ground plate-glass, and two or three more capsulæ which do not require to be covered; two or three glass funnels, to wash the plate; and two or three glass holders, in the shape of a spoon or shovel, by which the plate is supported when put in and taken out of the solution, without touching it with the fingers.

The Daguerrotype plate is submitted to the engraving process, after having been washed in the hyposulphite of soda, and afterwards in distilled water.

First process for biting in or engraving the plate.—The following solutions must be put in the capsulæ, in sufficient quantity, so as to entirely cover the plate:—1. Acidulated water. 2. Alkaline water. 3. Alcoholized potash, in covered capsulæ. 4. Caustic potash, in covered capsulæ. 5. Distilled water.

The plate being put upon the glass holder or spoon, is plunged in the acidulated water, and agitated during a few seconds, then put into a glass funnel, and washed with distilled water. It is taken again with the glass spoon, and plunged in the capsula containing alcoholized potash. This capsula is covered with its glass cover, and then heated, by means of a spirit-lamp, to about 144° Fahrenheit. The plate must remain in the capsula half an hour, during which the solution is heated now and then, and agitated. During that time, the following acid solution, which will be called *normal acid*, must be prepared; it is composed as follows:—Water 600 parts, nitric acid 45 parts, solution of nitrite of potassa 12 parts, solution of common salt 45 parts. These proportions are in volume. The normal acid must be poured in a capsula, covered with its glass cover, and a sufficient quantity must be kept in the bottle.

When the plate has been immersed in the alcoholized potash during half an hour, it is taken out of the solution by means of the glass holder, and immediately plunged in the alkaline water, and agitated pretty strongly; from thence it is put in distilled water. (A)

This being done, the plate is plunged in the acidulated water, and moved about therein for a few seconds: it is then put into the normal acid. When the plate has been immersed a few seconds in the acid, it is taken out by means of the glass holder, taking care to keep it as much as possible covered with the solution, and it is immediately placed horizontally upon a stand, and as much acid as the plate can hold is poured upon it from the bottle; it is then heated with a spirit-lamp, but without attaining the boiling point. During this operation it is better to stir or move about the acid on the plate by pumping it, and ejecting it again, by means of a pipette or glass syringe; after two or three minutes the acid is thrown away, the plate is put in the glass funnel, and there well washed with water, and afterwards with distilled water. (B)

Then, without letting the plate dry, it is put upon the fingers of the left hand, and with the right hand some ammoniacal chloride of silver, which is moved about the surface by balancing the hand, is poured upon it; the solution is renewed until the chloride, formed by the action of the acid, is dissolved; the plate is then washed by pouring upon it a large quantity of ammoniacal water, and afterwards some distilled water. (C)

Without allowing the plate to dry, it is then put in the caustic potash, and the capsula being placed upon the stand, the potash is heated up to the boiling point; it is then left to cool (D); and beginning again the operations described from A to D, a second biting is obtained; and by repeating again the operations described in A and B, a third biting is produced. The plate is then dried; in this state the black parts of the plate are filled with chloride of silver.

The plate is then polished until the white parts are perfectly pure and bright. This polishing is done with cotton and "ponce" (pumice stone); afterwards, the chloride of silver, filling the black parts, is cleansed by the means described in B and C. The plate is then dried; but before drying, it is well to rub the plate slightly with the finger, in order to take off from the black parts any remains of an insoluble body which generally remain on it. The preparatory engraving is then finished, and the plate has the appearance of a very delicate aquatint engraved plate, not very deeply bitten in.

Nevertheless, if the operation has been well managed, and has been successful, it is deep enough to allow the printing of a considerable number of copies.

Note.—Sometimes, instead of treating the plate with the boiling potash in the capsula, a similar result may be obtained by placing the plate upon the stand, covering it with the solution, and heating it by means of a spirit-lamp, until, by evaporation, the potash becomes in a state of ignited fusion. By this means the grain is finer, but the white parts are more liable to be attacked.

Last operation of biting in.—This operation requires some of the re-agents before named, and also,

1. A siccative ink, made of linseed oil, rendered very siccative by boiling it sufficiently with litharge; it may be thickened with calcined lamp-black.

2. An electrotype apparatus, and some solutions fit to gild and copper the plate.

Means of operating.—The plate must be inked as copper-plate printers do, taking care to clean off the white parts more perfectly than usual; the plate is then to be placed in a room sufficiently warm, until the ink is well dried, which requires more or less time, according to the nature of the oil employed. The drying of the oil may be hastened by heating the plate upon the stand with the lamp, but the slow process is more perfect and certain.

When the ink is well dried, the white parts are cleaned again by polishing the plate with cotton and pounce, or any other polishing powder: a ball of cotton, or any other matter, covered with a thin piece of caoutchouc or skin, can be used for this purpose. When polished, the plate is ready to receive the electro-chemical-coating of gold, which will protect the white parts.

Gilding.—The gilding is obtained by any of the various processes of electrotyping which are known. The only indispensable condition is, that the surface obtained by the precipitation must not be liable to be attacked by any weak acid; a solution answering this purpose is made of ten parts (by weight) of ferrocyanide of potassium, one part of chloride of gold, and 1000 parts of water, used with a galvanic battery. During the gilding the plate must be turned in several positions, in order to regulate the metallic deposit. In some cases the gilding may be made more perfect, if the plate is covered with a thin coating of mercury before being put in the gilding solution.

When the plate is gilded, it must be treated with the boiling caustic potash, by the process already indicated for the preparatory engraving, in order to cleanse it from all the dried oil or ink which fills the hollows. The plate is then washed and dried, and when the oil employed has been thickened with the lamp-black, the surface of the plate is rubbed with crumb of bread, in order to cleanse and take off the black remaining; then, the white parts being covered and protected by a varnish not liable to be attacked, and the black parts being uncovered and clean, the plate can be bitten in by aquafortis, according to the ordinary process used by engravers.

This operation must be done upon the stand, and not by immersing the plate in the solution.

Before this last biting-in, if the preparatory engraving has not succeeded well, and the plate still wants a sufficient grain, it can be given by the various processes of aquatint engraving.

Before submitting the plate to the operation of printing, in order to insure an unlimited number of copies, it is necessary, as before stated, to protect it by a slight coating of copper, which is obtained by the electrotype process; otherwise the printing would soon wear the plate. This coating must be kept very thin, lest the fineness of the engraving, and the polish of the white parts, should be destroyed. In this state the plate can be delivered to the printer.

After a certain number of impressions have been obtained, it will be perceived that the coating of copper is worn in some place

then, this coating must be removed, and a fresh one applied in its place. For this purpose, the plate must be purified and cleansed by warm potash, and plunged in a weak acid composed as follows:—Water, 600 parts; nitric acid, 50 parts; nitrous acid of engravers, 5 parts; all in volume. This acid will dissolve the coating of copper, and the plate being coppered again by the same means as before, may be again submitted to the operation of printing; and as nothing can prevent the success of a repetition of the same operation, any number of impressions may be obtained. The coating of copper can also be removed by caustic ammonia.

The Daguerrotype plate engraved by this process, which constitute the present invention, consist,—

First,—in the discovery and employment of certain properties of a mixture composed of nitric acid, nitrous acid, and hydrochloric acid, in determined or fixed proportions. The two last-mentioned acids may be employed either in a free state, or combined with alkaline or other basis. This mixed acid has the property of biting the pure silver which forms the black parts of the Daguerrotype picture, without attacking the white parts formed by the amalgam of mercury. The result of the action of the biting is to form on the black parts of the picture an insoluble chloride of silver; and this chloride of silver which when formed stops the action of the acid, is dissolved by ammonia, which allows the biting to continue.

Secondly,—in the discovery of certain properties of a warm solution of caustic potash, and in the employment of the said solution, by which the mercury forming the picture is better and deeper amalgamated with the silver under it, so that many imperceptible points of the amalgam are effected in such a manner that the acid has no action upon them.

Thirdly,—in the discovery and employment of a process which produces a grain favourable to the engraving, by which the biting on the plate is rendered deeper. This is effected by filling the parts engraved with a siccative ink, or any other substance, and then gilding the plate by the electrotype process; the gold is not deposited on the parts protected by the ink. When the plate is gilded, the ink is cleansed by the caustic potash, and the plate may be submitted to the effects of an acid which does not attack the coating of gold, but bites only on the silver in the parts already engraved by the first operation.

Fourthly,—in the employment of a process by which the plate is protected from the wear of the printing operation. This is effected by covering the plate before printing with a slight coating of copper

by the electrotype process, and when the coating begins to wear by printing, it is removed by a weak acid, or by ammonia, which dissolves the copper without affecting the silver under it. The plate is coppered again, and after another printing the same operation is repeated, so that a considerable number of copies may be printed without much injury to the engraving.

M. Daguerre's New Mode of Preparing Plates.

The subjoined account of this process is taken from a letter of M. Daguerre's to Mr. Arago, of the Academie, published in the Comtes Rendus, No. 17, April 22nd, 1844. It presents many difficulties, and has been adopted by very few persons in this country, but as the latest contribution of the inventor of the Daguerreotype, it deserves at least a fair trial.

After stating that the proofs now obtained, though not deficient in purity, leave much to be descried, in general effect and relief, Monsieur Daguerre continues thus :—

It is by superposing on the plate several metals, reducing them to powder by friction, and by acidulating the empty spaces which the molecules leave, that I have been enabled to develop galvanic actions which permit the employment of a much thicker layer of iodide, without having to fear, during the operation of light in the camera-obscura, the influence of the liberated iodine.

The new combination which I employ, and which is composed of several metallic oxides, has the advantage of giving a sensible layer capable of receiving impressions simultaneously by all the degrees of tone; and I thus obtain, in a very short space of time, the representation of objects vividly enlightened with demi-tints, all of which retain, as in nature, their transparency and their relative value.

By adding gold to the metals which I first used, I am enabled to avoid the great difficulty which the use of bromine, as an accelerating substance, presented. It is known, that only very experienced persons could employ bromine with success, and that they were able to obtain the maximum of sensibility only by chance, since it is impossible to determine this point very precisely, and since immediately beyond it the bromine attacks the silver, and is opposed to the formation of the image.

With my new means, the layer of iodine is always saturated with bromine, since the plate may, without inconvenience, be left

exposed to the vapour of this substance for at least half the necessary time; for the application of the layer of gold is opposed to the formation of what is called the veil of bromine. This facility must not, however, be abused; for the layer of gold, being very thin, might be attacked, especially if too much polished. The process which I am about to give may, perhaps, be found rather complicated; but, notwithstanding my desire to simplify it as much as possible, I have been led, on the contrary, by the results of my experiment, to multiply the substances employed, all of which play an important part in the whole process. I regard them all as necessary for obtaining a complete result, which must be the case, since I have only gradually arrived at discovering the properties of these different metals, one of which aids in promptitude, the other in the vigour of the impression, etc.

From the concurrence of these substances, arises a power which neutralises all the unknown effects which so often oppose the formation of the image.

I think, besides, that science and art should not be interrupted by the consideration of a more or less long manipulation; we should be contented to obtain beautiful results at this price, especially when the means of execution are easy.

For the galvanic preparation of the plate does not present any difficulty. The operation is divided into two principal parts: the first, which is the longest, may be made a long time previously, and may be regarded as the completion of the manufacture of the plate. This operation, being once made, serves indefinitely; and, without recommencing it, a great number of impressions may be made on the same plate.

Preparation of the New Substances.

Aqueous Solution of Bichloride of Mercury.—5 decigrammes of bichloride of mercury in 700 grammes of distilled water.

Solution of Cyanide of Mercury.—A flask of distilled water is saturated with cyanide of mercury, and a certain quantity is decanted, which is diluted by an equal quantity of distilled water.

Acidulated White Oil of Petroleum.—This oil is acidulated by mixing with it one-tenth of pure nitric acid, leaving it at least forty-eight hours, occasionally agitating the flask. The oil, which is acidulated, and which then powerfully reddens litmus paper, is decanted. It is also a little coloured, but remains very limpid.

Solution of Chloride of Gold and Platinum.—In order not to

multiply the solutions, I take the ordinary chloride of gold, used for fixing the impressions, and which is composed of 1 gramme of chloride of gold, and 4 grammes of hyphosulphite of soda, to a quart of distilled water.

With respect to chloride of platinum, 2½ decigrammes must be dissolved in three quarts of distilled water; these two solutions are mixed in equal quantities.

Modus Operandi.

First Preparation of the Plate.

Note.—For the sake of brevity in the following description, I will abridge the name of each substance. Thus, I will say, to designate the aqueous solution of bichloride of mercury, sublimate; for the solution of cyanide of mercury, cyanide; for the acidulated oil of petroleum, oil; for the solution of chloride of gold and platinum, gold and platinum; and for the oxide of iron, rouge only.

The plate is first polished with sublimate and tripoli, and afterwards with rouge, until a beautiful black is arrived at. Then, the plate is layed on the horizontal plate, and the solution of cyanide is poured on it and heated over a lamp, as in fixing an impression with chloride of gold. The mercury is deposited, and forms a whitish layer. The plate is allowed to cool a little, and, after having poured off the liquid, it is dried by rubbing with cotton and sprinkling it with rouge.

It is now necessary to polish the whitish layer deposited by the mercury. With a piece of cotton steeped in oil and rouge, this layer is rubbed until it becomes of a fine black. In the last place, it may be rubbed very strongly, but with cotton alone, in order to render the acidulated layer as thin as possible.

The plate is afterwards placed on the horizontal plane, and the solution of gold and platinum is poured on. It is heated in the ordinary manner; it is then allowed to cool, the liquid is poured off, and it is dried by gentle friction with cotton and rouge.

This operation must be performed with care, especially when the impression is not immediately continued; for, otherwise, some lines of liquid would be left on the plate, which it is difficult to get rid of. After this last friction, the plates should be only dried, and not polished.

This concludes the first preparation of the plate, which may be made a long time previously.

Second Preparation.

Note.—I do not think it fit to allow a longer interval than twelve hours to intervene between this operation and iodizing the plate.

We left the plate with a deposit of gold and platinum. In order to polish the metallic layer, the plate is rubbed with a piece of cotton, and oil and rouge, until it again becomes black ; and then with alcohol and cotton only, in order to remove this layer of rouge as much as possible.

The plate is then rubbed very strongly, and passing several times over the same places, with cotton impregnated with cyanide. As this layer dries very promptly, it might leave on the plate traces of inequality ; in order to avoid this, the cyanide must be again passed over it, and, while the plate is still moist, we quickly rub over the whole surface of the plate with cotton imbibed with a little oil, thus mixing these two substances ; then, with a piece of dry cotton, we rub in order to unite, and at the same time, to dry the plate, taking care to remove from the cotton the parts which are moistened with cyanide and oil. Finally, as the cotton still leaves traces, the plate is likewise sprinkled with a little rouge, which is removed by gently rubbing.

Afterwards, the plate is again rubbed with cotton impregnated with oil, only in such a manner as to make the burnish of the metal return ; it is then sprinkled with rouge, and then very gently rubbed round, in such a manner as to remove all the rouge, which carries with it the superabundance of the acidulated layer.

Finally, it is strongly rubbed with a rather firm pledget of cotton, in order to give the best polish.

It is not necessary often to renew the pledgets of cotton imbibed with oil and rouge ; they must only be kept free from dust. I have said above, that the first preparation of the plate may serve indefinitely ; but it will be comprehended, that the second must be modified, according to whether we operate on a plate which has received a fixed or an unfixed impression.

On the Fixed Impression.

The stains left by the washing-water, must be removed with rouge and water, slightly acidulated with nitric acid (at 36° F, at this season [April?] and less in summer.)

Afterwards, the plate must be polished with oil and rouge, in order to remove all traces of the image.

The operation is then continued, as I have just described, for the second preparation of the new plate, and beginning with the employment of alcohol.

On the Unfixed Impression (but whose sensible layer has been removed in the ordinary manner.)

First, the plate must be rubbed with alcohol and rouge, in order to remove the traces of oil which serve for receiving the foregoing impression.

We afterwards proceed, as indicated above, for the new plate, beginning with the employment of alcohol.

Observations.

On Iodizing.—The colour of the impression depends on the tint given to the metallic iodide; it may, therefore, be varied at will. However, I have found the violet rose colour most suitable.

For transmitting the iodine to the plate, the sheet of cardboard may be replaced by an earthenware plate, deprived of enamel. The iodine transmitted by this means is not decomposed; it is useless, I may even say injurious, to heat the plate before exposing it to the vapour of iodine.

Washing with Hyposulphite of Soda.—In order to remove the sensible layer, the solution of hyposulphite of soda must not be too strong, because it destroys the sharpness of the impression. Sixty grammes of hyposulphite are sufficient for 1 quart of distilled water.

APPENDIX.

We subjoin the formula for making a few of the solutions used in the Daguerreotype process; but we must caution those who may be ignorant of Chemistry, that some of the substances used, are deleterious and corrosive, and that great care should be taken that

they do not touch the person, dress, or surrounding objects. A drop of Bromine, for example, accidentally thrown into the eye might easily destroy the sight.

Chloride of Iodine.

The Chlorine is procured by putting pure oxide of manganese, broken into small pieces in a glass retort, and pouring upon it some hydro-chloric (muriatic) acid. The retort communicates by a bent tube with a small bottle containing iodine, which it promptly liquefies. When the resulting liquid becomes a bright red, the operation is complete. The Chloride of Iodine should be preserved in a bottle well stopped, a little white wax round the stopper will prevent its adhering to the neck of the bottle. In conducting this operation, precaution must be taken that the Chlorine does not escape; this gas being highly deleterious.

Eau Bromee.

Add an excess of Bromine to pure water* in a bottle, shaking it well for some minutes. To one part of this solution, add forty parts water, and the mixture, of a bright yellow, is ready for use.

Bromide of Iodine.

In a bottle which holds about three ounces, put 30 to 40 drops of Bromine,—the quantity is not very important. Add Iodine, grain by grain, till the Bromine is saturated. The Iodine which does not dissolve, may remain in the bottle. To one part of Bromide of Iodine, add 200 parts water, and it is ready for use.

Gilding Solution.

The receipt for this solution, as given by M. Fizeau, the inventor of this method of fixing, is as follows:—

Dissolve one part of Chloride Gold in 800 parts of water, and four parts hyposulphite soda in 200 parts water,—pour the solution of gold into that of soda, by little and little, shaking it all the while, the mixture at first slightly yellow, soon becomes perfectly limpid. This mixture may be bought ready prepared of the Opticians.

* If you are nof sure of the purity of the water, add a few drops of nitric acid.

Comparison of French and English Measures.

Measures of Weight.

	English Grains.		Avord. Weight.
Decigramme	1.5433	..	
Gramme	15.4330	..	
Decigramme	154.3300	..	0.022
Hectogramme	1543.330	..	0.220
Kilogramme	15433.0000	.	2.204

Measures of Capacity.

	Imperial.		
	Galls.		Pints.
Litre	0	..	1.76377
Decalitre	2	..	1.4464
